Last night (9th inst.) the upper northern sky was obscured with cumulous cloud, but in a clear space above the horizon, from N. to N.E., a belt of cloud resembling that of the previous night extended obliquely. In this case the belt was dark; but beneath, and apparently descending from it, bright luminous patches formed of a golden lustre at midnight, and faded out at 1.30 a.m. Wind again from N.W., light. Temperature cool for season.

Examined with a good field-glass, these cloudlets present the usual cirrous type in all but singular luminosity, and little (if any) of the aurora. D. J. ROWAN

Dundrum, co. Dublin, July 10

Animal Intelligence

A REMARKABLE instance of animal intelligence has lately come under my notice, which I venture to relate as being possibly of interest to the readers of NATURE. In a neighbour's bungalow in this district two of our common house-swallows (*Hirundo javanica*) built their nest, selecting as their site for the purpose the top of a hanging lamp that hangs in the dining-room. As the lamp is either raised or depressed by chains fixed to a central counter-weight, these chains pass over pulleys fixed to a metal disk above, on which the nest was placed. The swallows evidently saw that, if the pulleys were covered with mud, moving the lamp either up or down would destroy the nest; so to avoid this natural result they built over each pulley a little dome, allowing sufficient space, both for wheel and chain to pass in the hollow so constructed, without danger to the nest, which was not only fully constructed, but the young birds were reared without further danger. This is, in my opinion, a wonderful example of adaptation to environment, and showing a step far beyond what may be contended as instinct only.

I may here add another curious case which seems to point to another branch of reasoning. During the dry weather I have been constantly annoyed by wasps building up with mud key-holes, sometimes keys, blank cartridge cases, and even in one case a *pen-holder*. As I did not care to have my gun charged with young wasps, I used to empty out any cartridge case which I found closed up with mud, but one cartridge-case in particular I noticed had been selected. This one I had left on my office table, and each time the wasp closed it UP I drew the charge of mud and "grubs," &c.; but as frequently the wasp closed it up again. I may here mention that the wasp used to deposit the egg, and several small grubs in a cell, close over the top, and repeat the operation again till the cartridge was full, when the mouth would be pasted over with a lid of mud. As I repeatedly knocked out the grub and mud, it appears the wasp started a fresh plan. I noticed somewhat to my surprise that the mouth of a cartridge I had but a few hours before emptied was pasted over, so I thought it would be interesting to see how many grubs the wasp had secured in so short a time. I therefore removed the fresh lid, that was still damp, and discovered nothing inside! I am unable to say if this was done to direct my attention to one particular cartridge case or not, while another spot was being used, but I am inclined to believe such to have been the case, for later I noticed a gap made between two bundles of letters in one of my pigeon-holes, well built up with mud, and, of course, as well packed with grubs.

Ballangoda, Ceylon, June 14 FREDERICK LEWIS

Deafness and Signs

IN my studies with regard to the sign-languages I have, like others, turned some attention to cases of deafness. In such cases the use of signs, not the finger alphabet, but natural or conventional signs, such as are used by Indians or by deaf-mutes of themselves, have appeared to me to give particular satisfaction to the sufferer. The nervousness attendant upon attempting to make out what is said being avoided, the relief is very great, and more attention is given to what is spoken. Of course such aid to those untrained is but partial, and English people accustomed solely to the use of speech are rather unapt, but nevertheless signs are valuable auxiliaries, and will be found worth trying. Individuals vary in their capability, but inasmuch as many children pass through a period of sign-language, there will be many cases of adaptability. Whoever has watched deaf-mutes conversing, without the finger alphabet or without lip-reading, will recognise the satisfaction they receive from their intercourse by signs. My only object is to call attention to what has been found by experience to be an acceptable help, and which may be extended in its application.

HYDE CLARKE

The Duration of Germ-Life in Water

A RECENT announcement by Messrs. Crookes, Odling, and Tidy, that *Bacillus anthracis* in water approximately devoid of nutrient material after "a few hours" loses its power to multiply in suitable culture-media, induces me to send you a note of my own results in the same domain.

My observations were commenced in 1877, but were shortly afterwards suspended and not resumed in earnest until May 1885.

So far I have worked only with the various forms of organisms which chanced to be present in the water—usually distilled—employed. For a *preliminary* investigation I regard this as preferable to operating on pure cultures; one is more likely to be concerned with organisms of aqueous habitat naturally, and one sees which kinds predominate from time to time, and which survive.

In dealing with an indefinite variety of micro organisms it is necessary, of course, to be extremely rigid in one's precautions to guard against intrusion of foreign germs, an intrusion which cannot be detected as in the case of pure cultures. On this account I abandoned my original *modus operandi*—it was almost identical with that of Mr. Crookes and his colleagues—and adopted the arrangement of tubes described and figured in a paper by Mr. Blunt and myself in *Proc. Roy. Soc.*, vol. xxviii. p. 202.

Of a series of such tubes containing distilled water, originally rich in germ-life, kept at a temperature varying from 18° C. to 21° C., and examined at intervals from May 2, 1885, down to now, I find that in every one micro-organisms have sooner or later developed on the addition of the nutrient material.

Each tube is a microcosm, and it has been most interesting to observe how, as elsewhere, as time went on, the first dominant form has grown more and more feeble, until it seems to have become extinct, and is now succeeded by races of quite different kind. Whether the new order will yet give place to others remains to be seen. I can at any rate say confidently that micro-organisms vary greatly in the duration of their life in distilled water, and that some forms may survive for at least fourteen months in that medium at an ordinary temperature.

Chelmsford, July 19 ARTHUR DOWNES

The Bagshot Beds

IN reply to the letter from Mr. Irving in NATURE of July 8 (p. 217), I beg to state that a mere abstract of the paper on the Bagshot Beds by Mr. Herries and myself was read at the meeting of the Geological Society on June 9, on which occasion Mr. Irving was not present; that the report of our remarks in NATURE of July 1 (p. 210) only purports to give the conclusions at which we arrive, and not the evidence by which they are supported. We trust therefore that your readers will reserve their judgment until the entire paper is published.

HORACE W. MONCKTON

1, Hare Court, Temple, July 17

A Lubricant for Brass Work

MANY besides myself have probably been inconvenienced by the corrosive action of ordinary lubricants—lard, grease, &c.—upon brass and copper, which causes the plugs of stop-cocks to leak or get fixed in their places, and does much damage to air-pump plates.

Melted india-rubber answers fairly, but it has too little "body," and too much glutinosity; moreover, it does, undoubtedly, in course of time, harden into a brittle, resinous substance. Vaseline is quite without action on brass, and never hardens; but it has not sufficient tenacity and adhesiveness.

A mixture of two parts by weight of vaseline (the common thick brown kind) and one part of melted india-rubber seems to combine the good qualities of both without the drawbacks of either.

The india-rubber should, of course, be pure (not vulcanised), and should be cut up into shreds and melted at the lowest possible temperature in an iron cup, being constantly pressed

down against the hot surface and stirred until a uniform glutinous mass is obtained. Then the proper weight of vaseline should be added, and the whole thoroughly stirred together.

This may be left on an air-pump plate for at any rate a couple of years without perceptible alteration either in itself or the brass. H. G. MADAN

Eton College

Butterflies' Wings

CAN you inform me of any method of relaxing the wings of butterflies allowed to stiffen in the closed state?

Stretford, Manchester, July 1 J. M. B.

[If the butterflies are laid on damp sand under cover of a bell-glass or other air-tight covering they will soon relax so as to be fit for setting-out. A drop or two of carbolic acid on a sponge should be placed with them in order to prevent mouldiness. —ED.]

NOTE ON THE ABSORPTION SPECTRUM OF DIDYMIUM

IN a paper on "Radiant Matter Spectroscopy" (Part 2, Samarium),[1] I said that in fractionation of the didymium earths with ammonia—"After a time a balance seemed to be established between the affinities at work, when the earths would appear in the same proportion in the precipitate and in the solution. At this stage they were thrown down by ammonia, and the precipitated earths set aside to be worked up by the fusion of their anhydrous nitrates so as to alter the ratio between them, when fractionation by ammonia could be again employed."

That in most methods of fractionation a rough sort of balance of affinities beyond which further separation by the same method is difficult, appears to be a general rule. I have long noticed this action when fractionating with ammonia, with oxalic and nitric acids, and with formic acid. The valuable point which renders this fact noteworthy is that the balance of affinities revealed by fractionation is not the same with each method. It was in consequence of the experience gained in these different methods of fractionation that I wrote in my paper read before the Royal Society, June 10 last (*Chemical News*, vol. liv. p. 13), after saying that I had not been able to separate didymium into Dr. Auer's two earths, "probably didymium will be found to split up in more than one direction according to the method adopted."

In illustration of this I may mention that, although I have not split up didymium into the two earths, or groups of earths, which are described by Dr. Auer, other processes of fractionation give me, so to speak, other cleavage planes or lines of scission through the compound molecule didymium.

According to Dr. Auer, a line in the well-known yellow band, close to the soda line, but less refrangible (w.l. about 579), is a component of the absorption-spectrum of neodymium, and therefore, under all conditions, its intensity should follow the same variations as the other bands of neodymium in the blue (wave-lengths 482, 469, 444). Some of my didymium fractions, however, show that the line 579 does not follow the same law as the other bands I have named. Thus, in a rather low fraction (+ 6) of the didymium earths from gadolinite and samarskite I found that the neodymium line 579 was of the same degree of blackness as the adjacent praseodymium line in the yellow (wave-length about 571), but the bands in the blue of neodymium had almost disappeared. In the adjacent fractions of didymium I was enabled, by appropriate dilution, to keep this set of bands in the yellow as a standard, of exactly the same intensity; it was now seen that in successive fractions the intensities of the other more refrangible lines belonging both to neodymium and praseodymium varied greatly from strong to almost obliteration, the bands in the yellow always being kept of the same intensity.

Didymium prepared from a specimen of fluocerite differed somewhat from the other didymiums. Here the band 579 (ascribed to neodymium) was very strong, the band in the yellow of praseodymium (571) slightly weaker, and the bands in the blue of neodymium (482, 469, and 444) easily visible. On diluting the solution the bands in the blue of neodymium and the one component of praseodymium in the yellow (571) appeared to follow the same law in becoming fainter and fainter with dilution, whilst the other component band in the yellow of neodymium (579) remained unaffected.

It seems to me that a possible explanation of this variation might be founded on the great strength of the bands in the yellow, and that the two fractions of didymium then under examination might differ only in the fact that one was slightly stronger than the other. To test this hypothesis I took the two fractions first experimented on, and putting each into a wedge-shaped cell of glass viewed them together in the spectroscope. (1) I adjusted the wedges so that the group in the yellow appeared to be of the same intensity in each spectrum. On examining other parts of the spectrum it was seen that in one solution the bands in the green were tolerably strong, and the bands in the blue scarcely visible, whilst in the other solution the bands in the green were very faint, and those in the blue quite absent. (2) The position of the wedges was adjusted so that the bands in the green in each case should be of equal intensities. It was now seen that the alteration had greatly upset the balance of the bands in the yellow, the solution in which the bands in the green were faintest before, now having much stronger yellow bands than the other. The explanation mentioned above therefore falls through, and I see no other way of accounting for the facts except in the supposition that by the mode of fractionation then adopted, didymium had split up in a different manner to what it would have done if the method of Dr. Auer had been followed.

The colour of the different fractions of didymium nitrate varies from a dark rose-red at the more basic end (+ 17) to amber at the less basic end (+ 4). These variations in colour do not necessarily accompany a difference in the absorption-bands, for in one instance an amber and a rose-coloured salt were found to have almost identical spectra.

It would almost appear from these experiments, coupled with the facts I brought forward in last week's *Chemical News* (p. 14), that the "one band, one element" theory I lately advanced in connection with the phosphorescent spectrum of yttrium, may probably hold good in the case of the group of elements forming absorption spectra. According to this hypothesis, therefore, neodymium and praseodymium must not be considered as actual chemical elements, but only the names given to two groups of molecules into which the complex molecule didymium splits up by one particular method of fractionation.

WILLIAM CROOKES

[1] *Phil. Trans.*, Part 2, 1885, p. 706. A reprint of this paper is also commenced in No. 1390 of the *Chemical News*, p. 28.

HEATING AND COOKING BY GAS

A FEW years ago the public was led to believe that the use of coal-gas for lighting purposes was on its trial, and must shortly give way to the electric light. Threatened institutions live long, and even if coal-gas is destined to be eventually superseded by electricity for lighting purposes, a useful future is now opening out for it as a fuel offering many advantages over coal for domestic heating and cooking. In these fields it may possibly occur in the future that coal-gas—unless the price is everywhere considerably reduced—will have to encounter rivals such as the petroleum oils on the score of their cheapness, but at present, coal-gas, for cooking